

**United States
Department
of Agriculture**



**Economic
Research
Service**

**Economic
Research
Report
Number 4**

Nutrition Labeling in the Food-Away-From-Home Sector

An Economic Assessment

Jayachandran N. Variyam





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April 2005



A Report from the Economic Research Service

www.ers.usda.gov

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Abstract

Americans spent about 46 percent of their total food budget on food away from home in 2002, up from 27 percent in 1962. Such foods tend to be less nutritious and higher in calories than foods prepared at home, and some studies have linked eating away from home to overweight and obesity in adults and children. Current nutrition labeling law exempts much of the food-away-from-home sector from mandatory labeling regulations. Because consumers are less likely to be aware of the ingredients and nutrient content of away-from-home food than of foods prepared at home, public health advocates have called for mandatory nutrition labeling for major sources of food away from home, such as fast-food and chain restaurants. This report provides an economic assessment of a food-away-from-home nutrition labeling policy, including justifications for policy intervention and potential costs and benefits of the policy.

Keywords: Diet quality, food labeling, government regulation, health, mandatory disclosure, nutrition information, Nutrition Labeling and Education Act, obesity, reformulation

Acknowledgments

The author is indebted to Eric Finkelstein, Pauline Ippolito, Fred Kuchler, Jordan Lin, and Mary Muth for helpful comments on earlier versions of this paper. Thanks also to Lou King for editorial assistance and Anne Pearl for layout and design. Any errors in this report are the author's responsibility.

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National Agricultural Library Cataloging Record

Variyam, Jayachandran N.

Nutrition labeling in the food-away-from-home sector:
an economic assessment.

(Economic research report (United States. Dept. of Agriculture.
Economic Research Service); no. 4)

1. Nutrition policy-United States.

2. Food service-United States.

3. Food-Labeling-Economic aspects-United States.

I. United States. Dept. of Agriculture. Economic Research Service.

II. Title.

TX360.U6

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Summary

Americans spent about 46 percent of their total food budget on food away from home in 2002, up from 27 percent in 1962. USDA's food intake surveys show that between 1977-78 and 1994-96, the share of daily caloric intake from food away from home increased from 18 percent to 32 percent.

While there are clear convenience benefits to consumers for substituting ready-to-eat foods prepared away from home for foods prepared at home, there are also costs. Studies suggest that foods consumed away from home are more calorie-dense and nutritionally poorer compared with foods prepared at home. Some studies have found an association between eating away from home and overweight and obesity in adults and children.

What Is the Issue?

Current nutrition labeling law exempts much of the food-away-from-home sector from mandatory labeling regulations. Because consumers are less likely to be aware of the ingredients and nutrient content of away-from-home food than of foods prepared at home, public health advocates have called for mandatory nutrition labeling for major sources of these foods, such as fast-food and chain restaurants.

What are the potential benefits and costs of a mandatory labeling policy for both consumers and the away-from-home food industry? Mandatory labeling could increase market efficiency and social welfare by allowing consumers to make informed choices. However, for the policy to be economically efficient, the benefits from the policy intervention should outweigh the costs.

What Did the Study Find?

This study takes a preliminary look at whether consumers might make more healthful food choices if nutrition labeling was mandated for the away-from-home food sector, and how labeling requirements would in turn affect the foodservice industry.

The costs of a labeling policy will depend chiefly on how much of the away-from-home food sector is subject to the mandatory disclosure requirement. Costs can be assessed reasonably well and include labeling costs, the cost of chemical analysis needed to determine the nutrient content of offerings, and reformulation costs.

The benefits of a labeling policy are harder to assess because the effect of label information on improving nutritional and health outcomes is uncertain. Research indicates that providing additional nutrition information in a restaurant setting has a limited effect on overall diet quality and reduced caloric intakes.

As a result of mandatory labeling requirements, producers may voluntarily decide to reformulate products to make them more attractive nutritionally. This reformulation could ultimately benefit all consumers, not just those who read nutrition labels.

However, studies have shown that producers behave strategically in such situations—for example, by reducing the price of less healthful foods—adding to the uncertainty about the eventual effect of reformulation on consumer diets.

Perhaps the largest benefit of labeling may accrue when consumers change their food choices based on the nutrition information provided by the labels. Although such substitutions may not change nutritional or health outcomes substantially, consumers benefit from being able to make food choices that are better aligned with their preferences.

The distribution of the costs and benefits among producers and consumers may also influence a labeling policy decision. Away-from-home food providers have different types of offerings, economies of scale, and levels of recipe standardization. Thus, a labeling policy will affect each provider differently. On the consumer side, the key question is whether those who already have good quality diets and healthy weights will reap the benefits, or whether those with poor diets and the overweight will share those benefits.

How Was the Study Conducted?

Research for this report included a literature review to gather evidence on the economic theory of information and labeling and on previous studies on the influence of nutrition information, labeling, and reformulation on food intakes. The research also included a statistical analysis of data from USDA's Continuing Survey of Food Intake by Individuals (CSFII) from 1989-91 and 1994-96 to estimate the effect of mandatory labeling requirements on product reformulation.

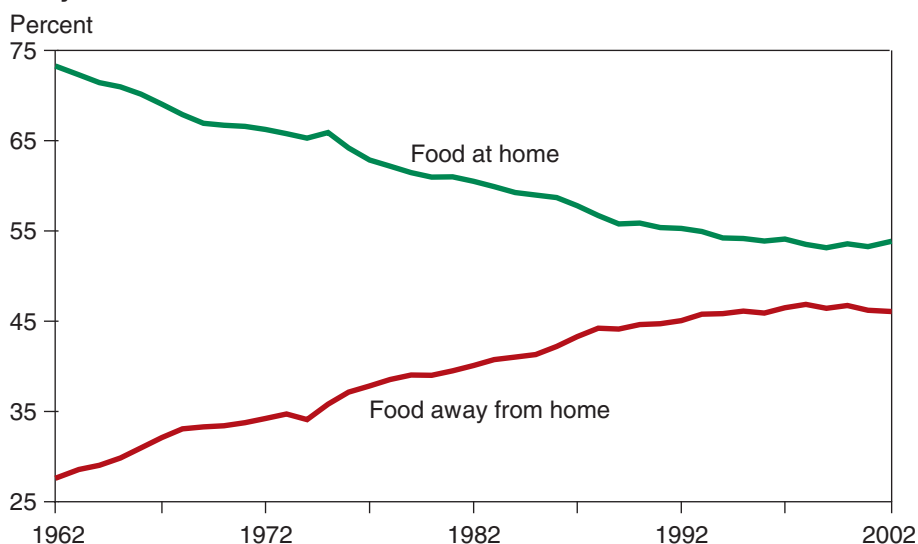
Introduction

A notable change in U.S. food consumption patterns in the last several decades has been the increasing popularity of foods prepared outside the home (food away from home). Food-away-from-home expenditures as a share of total food spending have risen steadily over the last several decades while the share of food-at-home expenditures has fallen (fig. 1). In 2002, Americans spent an estimated 46 percent of their total food budget on away-from-home foods, up from 27 percent in 1962. Increasingly, even food consumed at home may be a take-out meal from a restaurant, a drive-through meal from a fast-food outlet, a ready-to-eat meal from a super-market, or a meal delivered to the home (Davis and Stewart, 2002; Jekanowski, 1999). Estimates from USDA's food intake surveys show that between 1977-78 and 1994-96, the share of daily caloric intake from food away from home increased from 18 percent to 32 percent (fig. 2). While all age groups experienced the increase, it was highest among younger adults. In 1994-96, men age 18-39 obtained 39 percent of their daily calories from food prepared away from home, compared with 23 percent in 1977-78. For women of the same age group, the 1994-96 share was 37 percent compared with 21 percent in 1977-78 (Guthrie et al., 2002).

The rise in consumption of food away from home has paralleled the growing prevalence of overweight and obesity among both juvenile and adult populations in the United States, and many public health advocates have implicated an increased appetite for such food as a contributing factor (Nestle and Jacobson, 2000). The foodservice industry and restaurant groups reject any link between the rising obesity rates and foods consumed in restaurants or other away-from-home food sources. They point out that restaurants have a wide variety of menu choices and that customers must choose responsibly and with moderation (National Restaurant Association, 2002a).

Figure 1

Share of total food expenditures spent on food at home and away from home



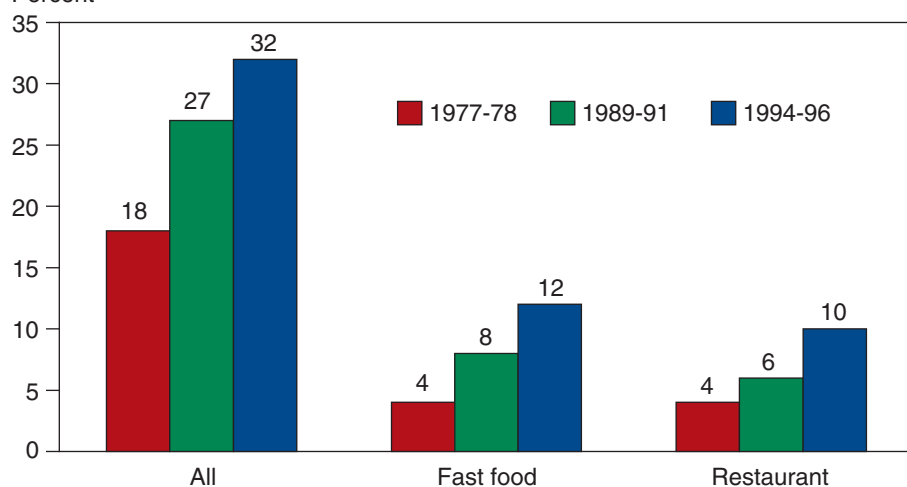
Source: Food Consumption (per capita) Data System, Economic Research Service, USDA.

USDA's food intake data unambiguously show that away-from-home foods tend to be of lower nutritional quality than food prepared at home (Lin et al., 1999, 2001; Guthrie et al., 2002). Foods prepared away from home contain more calories per eating occasion (meals and snacks) and are higher in total fat, saturated fat, and cholesterol and lower in dietary fiber, calcium, and iron on a per-calorie basis than food prepared at home (figs. 3 and 4). Americans who consume a "poor" quality diet based on the Healthy Eating Index tend to consume a greater proportion of their daily calories away from home than those with a "good" quality diet (table 1). Compared with those with good quality diets, individuals with poor quality diets have lower per capita expenditures on food away from home, but their away-from-home diets contain more calories per gram of food consumed.

Figure 2

Percent of calories from food away from home

Percent

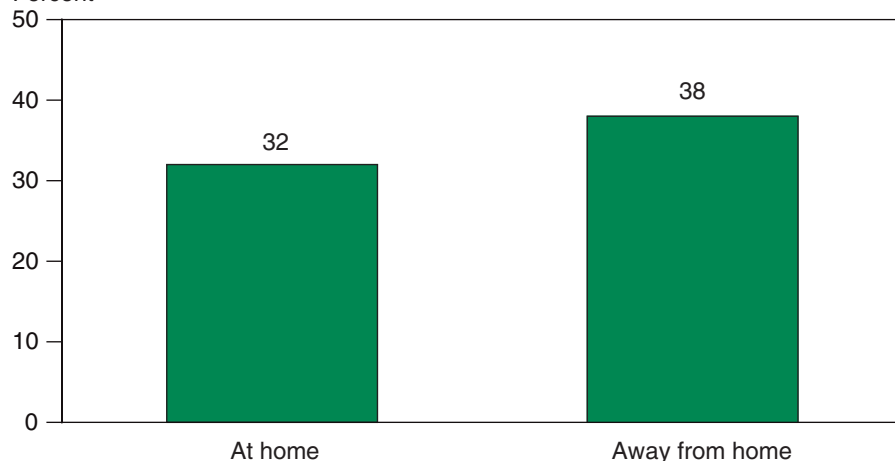


Source: Guthrie et al. (2002), and ERS calculations from Continuing Survey of Food Intake by Individuals, 1989-91.

Figure 3

Percent of calories from fat in at-home and away-from-home food, 1994-96

Percent

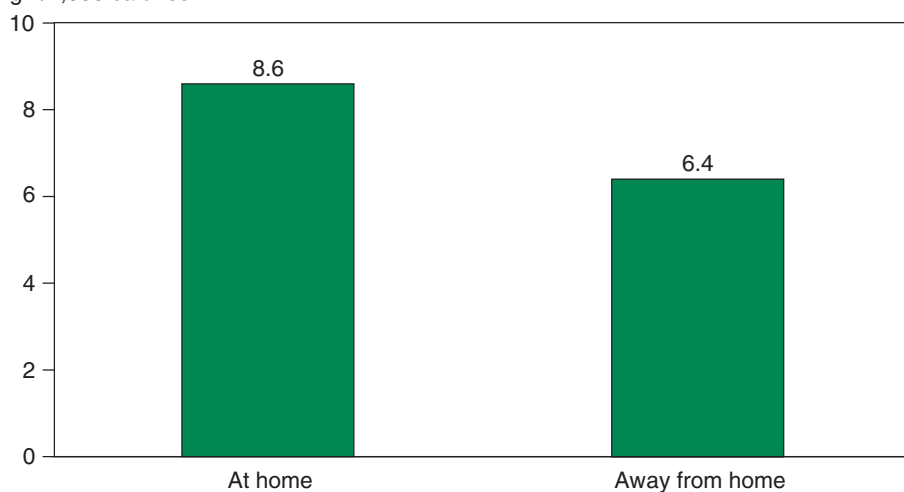


Source: Guthrie et al. (2002).

Figure 4

Dietary fiber from at-home and away-from-home food, 1994-96

gm/1,000 calories



Source: Guthrie, Lin, and Frazao (2002).

Table 1—Food away from home and diet quality

Characteristic	Diet quality class		
	Good	Needs improvement	Poor
Annual per capita expenditures on food away from home (\$)	700	630	543
Mean energy from food away from home per day (% of total energy intake)	23	34	33
Food-away-from-home energy density (calories/gram of food)	1.19	1.23	1.39
Food-at-home energy density (calories/gram of food)	0.83	0.89	0.93

Source: Author's calculations from the Continuing Survey of Food Intakes by Individuals (CSFII), 1994-96. The diet quality classification is based on the Healthy Eating Index (Veli and Variyam, 2003).

While no study has conclusively shown that food away from home causes overweight or obesity, some have found an association between body weight status and food source. For example, Binkley et al. (2000) found that, among both men and women, those who consumed a higher proportion of food from fast-food outlets tended to have a higher Body Mass Index (BMI). McCrory et al. (1999) reported a positive association between the frequency of consuming restaurant food and higher levels of body fat in adults. In a State-level analysis using data from the Behavioral Risk Factor Surveillance System over the 1984-99 period, Chou et al. (2002) found that a higher per capita number of restaurants was associated with higher BMI levels and obesity.

Given the possible link between obesity and increasing consumption of food away from home, there is growing demand for public policies aimed at

improving the nutritional quality of foods served in the food-away-from-home market. One proposed intervention would require menu boards and food packages in restaurants and other away-from-home sources of food to display nutrition information like that on the familiar “Nutrition Facts” panel found on most packaged foods sold in stores. The standardized “Nutrition Facts” panel, which lists information on macronutrients such as calories, total fat, saturated fat, and cholesterol in packaged foods, is the outcome of the 1990 Federal Nutrition Labeling and Education Act (NLEA). While NLEA requires nutrition labeling of most processed food products, there are important exemptions. Food prepared for immediate consumption—including restaurant meals, ready-to-eat foods prepared by carryout establishments, foods served in hospital cafeterias and airplanes, and that sold by foodservice vendors—are exempt from nutrition labeling. This exemption is revoked only if vendors make nutrition or health claims such as “low fat” or “heart healthy.” In such cases, restaurant owners or foodservice providers must be able to demonstrate that there is a reasonable basis for believing that the food qualifies for such a claim. However, exempted foods are not required to display the “Nutrition Facts” panel (Foulke, 1996).

According to the foodservice industry, “nearly all major foodservice operators have nutrition information programs in place to satisfy the public’s desire to know the nutritive value of the meals which they are consuming away from home” (Livingston, 1995). For example, many fast-food chains provide nutrition information in brochures or restaurant wall displays and on their web sites. However, menu boards and packages often do not list the nutrient content of specific food items or meals. Public health advocates contend that this lack of information limits the consumer’s ability to make informed choices. As a result, many are calling for extending the mandatory nutrition labeling law to major away-from-home providers of food. For example, the Center for Science in the Public Interest (CSPI), a nutrition and health advocacy group, has called for legislation to require restaurant chains with 10 or more stores to list on their menus the calories, saturated and trans fats, and sodium content of their standard menu items (CSPI, 2003). A similar proposal appears in Nestle (2002). These proposals are not new. A National Academy of Sciences study coinciding with the original NLEA legislation recommended mandatory labeling for food away from home (Porter and Earl, 1990). Padberg (1992, 1999) proposed developing a “meal nutrition quality index” to rate entrees on restaurant menus.

Economics of Labeling

Rising consumption of food away from home is driven by both demand- and supply-side forces. On the demand side, more women in the labor force and increases in real wages (*inter alia*) have increased the value of time and the demand for convenience. The income effect is reflected in the fact that expenditures on food away from home are more responsive to increases in income than at-home food expenditures. Studies show a 10-percent increase in income will lead to a 4.6-percent increase in a household’s away-from-home food expenditures, compared with a 1.3-percent increase in at-home food expenditures (Davis and Stewart, 2002). On the supply side, technological advances in food processing and transportation have enabled the

industry to provide an increasing variety of convenient fast food, take-out meals, and home-delivered food, which effectively reduce the time-price of foods (Davis and Stewart, 2002; Jekanowski, 1999; Jekanowski et al., 2001).

The amount of away-from-home food consumption and its dietary quality are the outcome of these demand and supply forces. As Lin et al. (1999) note, “Food away from home does not have to differ nutritionally from food prepared at home. Indeed, professional chefs and foodservice organizations may be particularly adept at preparing tasty meals that meet dietary recommendations. However, consumer demand for such meals must be strong enough to create an economic incentive for increased marketing of nutritious items by restaurants, fast-food, and other foodservice establishments.” Although empirical studies have found an association between away-from-home food consumption and obesity, they have not established a causal relationship. For instance, Chou et al. (2002) caution that, although the rising number of fast-food restaurants is related to higher obesity rates, the industry may simply be responding to an increase in the value of leisure time. In other words, a third factor—the higher value of time—may be contributing to both increased consumption of food away from home and increased obesity.

Criteria for Intervention

In theory, uninterrupted interplay of demand and supply forces ensure socially optimal allocation of resources in smoothly functioning competitive markets. However, there are important exceptions where markets may fail to allocate resources optimally, in which case appropriate government intervention can potentially increase social welfare.¹ Few would dispute that the food-away-from-home market is competitive. Therefore, the lower nutritional quality of food away from home or a possible link to obesity is not in itself enough to suggest or justify an intervention policy that mandates provision of nutrition information. If consumers are informed about the nutritional quality of food away from home, or can readily obtain such information at a cost they are willing to pay, and are making rational trade-offs between current consumption and potential future health consequences, an intervention policy that imposes costs on the market participants would be inefficient (in the sense that costs of the policy would outweigh any benefits from it).

However, a closer look at the economic case for nutrition labeling suggests that a policy of mandatory labeling for food away from home could be justified in two ways.² The first justification rests on the existence of a market failure in the food-way-from-home market due to an information problem between buyers and sellers. Specifically, the market may lack a credible mechanism to inform buyers about nutritional attributes of products that sellers know about. This information deficit may lead consumers to make choices they wouldn’t have made with full information.

The second justification stems from a problem in the economic theory on which the intervention criteria are based. Specifically, consumers may not be the astute and forward-looking decisionmakers that economic theory

¹The corollary of this is that government intervention in the absence of market failure will reduce social welfare. However, government intervention in markets can be based on noneconomic criteria. For example, a public health approach may dictate specific interventions, including labeling of food away from home, to influence an outcome such as obesity. This report focuses only on economic criteria for intervention.

²A more detailed discussion of the economics of information regulation and labeling can be found elsewhere. See, for example, Beales et al. (1981); Golan et al. (2000); Teisl and Roe (1998).

assumes them to be. Instead, they may have limited self-control and bounded rationality that lead them to make choices that do not maximize utility. In both these cases, an intervention policy such as labeling could provide a mechanism for consumers to make better dietary choices and thus increase their own and society's welfare.³

Asymmetric Information in the Food-Away-From-Home Market

The smooth flow of product information between sellers and buyers increases the efficiency of markets in allocating resources among competing ends. Information about product attributes will enable consumers to make efficient choices by buying products that best match their attribute preferences. In turn, sellers will have an incentive to supply and compete based on favored attributes. Conversely, the presence of imperfect or asymmetric information among market participants can diminish market efficiency and reduce social welfare. When consumers fail to choose products with attributes that match their preferences, producers will lack signals to provide the preferred attributes or to compete based on them. This reduces market efficiency and product quality. In markets where sellers have information about product quality that cannot be credibly conveyed to the buyers (that is, buyers have no way of knowing if the information is accurate or truthful), only poor-quality products will be sold and, in the extreme case, the market may collapse (Akerlof, 1970). In such markets, mandatory information disclosure laws may increase social welfare by enabling sellers to credibly convey information and by aiding buyers to choose products that better match their preferences.

Most foods possess nutritional attributes that are referred to as credence attributes (Caswell and Mojduszka, 1996). Consumers cannot learn about credence attributes readily through inspection or even after consumption. Arguably, except through a costly information search, many consumers would have difficulty assessing the calories in or the saturated fat content of a purchased meal, comparing nutrient contents of different entrees from a supplier, or comparing nutrient contents of similar offerings from different suppliers. Sellers, however, are better informed about the ingredients used in preparation, the proportions in which they were mixed, the cooking methods used, and thus the nutritional attributes of the meal.⁴ Thus, the food-away-from-home market has the hallmarks of a market characterized by imperfect and asymmetric information.

However, the mere presence of attributes that are costly or difficult for consumers to evaluate in itself does not imply a market failure and justification for intervention. For the attributes valued by consumers, freely functioning markets provide incentives for sellers or third parties to disclose information without mandatory labeling laws. Information can be costly to produce and distribute, and consumers may not value all types of information. However, under certain conditions, firms selling superior quality products will have an incentive to disclose this product information to the buyers (Grossman, 1981). When some firms disclose information about product attributes, consumers may turn skeptical about sellers who do not. This competitive pressure leads to an increased availability of product informa-

³Another economic case for mandatory labeling may arise, albeit indirectly, if one individual's food-away-from-home decisions affect the utility or welfare of other individuals in the society. For argument's sake, suppose high food-away-from-home consumption is causally linked to obesity and higher risk of heart disease. The cost of medical treatment of these conditions will be borne not just by individuals with high food-away-from-home consumption, but will be shared by other individuals through employer and public health systems. Economists describe such situations as externalities. To the extent that such externalities arise from information problems in the food-away-from-home market, mandatory nutrition labeling may be one of the policy options for increasing social welfare. See Golan et al. (2000) for a more detailed discussion.

⁴Suppliers would face a cost in determining the nutritional profile of their meals. The marginal cost of such information would decline with the degree of recipe standardization. Such costs are also reduced by publicly available information on the nutrient content of foods; for example, USDA's Nutrient Data Laboratory, www.nal.usda.gov/fnic/foodcomp/.

tion from all but firms with the lowest quality products. Whether this increased availability of information occurs in practice depends crucially on the condition that sellers can convey quality information in an effective, low-cost, and truthful manner. Consumers must have a credible way to separate truthful claims from spurious ones. In markets that do not provide this condition, voluntary disclosure leads to only partial availability of product information and consumers may benefit from mandatory disclosure laws (Mathios, 2000).

Under current nutrition labeling regulations (the NLEA), restaurants and other away-from-home providers of food are permitted to make specific nutrient content claims so long as they substantiate the claims with relevant nutrition information if sought by consumers. Therefore, a credible mechanism is in place for voluntary labeling. The level of disclosure, however, depends on the cost of labeling (such as assessing the nutrient content of recipes, mentioned earlier; see footnote 4) and the benefit of labeling derived from consumer demand for nutrition information. Indeed, if consumer demand for nutrition information is strong enough, this should provide a powerful incentive for disclosure.

The nutrient composition of processed and prepared foods, however, has specific characteristics that create disincentives for producers to disclose nutritional information. First, for disclosure to be effective, consumers must be able to infer the quality of products for which there is no disclosure; that is, how inferior in quality are products without disclosure compared with products that have disclosure. For nutritional attributes such as fiber or calcium that have a positive health value, consumers may assume that undisclosed products have none of the attribute. For negative attributes such as energy, fat, or sodium, there is no such natural upper bound. Therefore, consumers will have difficulty in assessing the inferiority of products that do not disclose compared with products that do. This may limit the flow of information under a voluntary disclosure regime.

Second, and perhaps more important, ingredients that are positively valued by consumers for their taste (sugar, oils, salt) also provide the nutrients (calories, fat, sodium) that are negatively valued for their health effects. Human taste for food is largely determined by fat, sugar, and salt (Drewnowski, 1998; Levine et al., 2003). Therefore, producers use more of these ingredients to make their products more desirable. If revealing the nutritional characteristics associated with these ingredients reduces the demand for their products, producers have an incentive against supplying the information.⁵

The actual extent of voluntary disclosure in the food-away-from-home market under current rules is an empirical matter. Anecdotal evidence suggests that some providers, especially in the fast-food market, do compete based on disclosure of nutritional information (for example, a leading sandwich chain advertising the availability of sandwiches with 6 grams of fat or less). Others, as noted earlier, provide nutritional information in brochures, wall displays, or on their web sites. These disclosures, however, may have been prompted more by legal considerations than as a competitive strategy under the NLEA's voluntary disclosure rules (CSPI, 2003). While there have been no formal studies on whether or to what extent disclosure has

⁵For some specialized foods, if producers perceive that consumers value taste from an attribute sufficiently higher than its negative health effect, they may choose to disclose that attribute (to distinguish their product from those that have less of it). Under the labeling rules in the European Union, a product can be labeled as chocolate if it contains at least 1 percent of cacao (beans of the cacao plant that provides the chocolate liquor). Because of this rule, many European chocolate manufacturers compete by disclosing the cacao content of their chocolates, even though higher cacao content means higher fat; cacao beans contain about 54 percent fat (Wolke, 2004).

worked in the food-away-from-home market, some lessons can be drawn from changes that occurred in the market for packaged foods prior to and following NLEA implementation.

Mojduszka and Caswell (2000) examined labeling information on packages in 33 food product categories over pre- and post-NLEA periods from 1992-1999. They concluded that incentives for voluntary disclosure of nutritional content by food processing firms prior to NLEA did not generally result in reliable and consistent nutrition information available to consumers.

Mathios (2000) used supermarket scanner and nutrition label data that spanned the pre- and post-NLEA periods in the salad dressing market to address the consequences of moving from voluntary to mandatory labeling. He found voluntary disclosure to be an important market mechanism. Prior to the NLEA, all low-fat salad dressings had a nutrition label, while the majority of higher fat dressings did not. However, large variation in fat content remained among dressings that did not voluntarily label. Sales for those with the highest fat levels declined significantly after the NLEA. The fact that the relevant nutritional attribute—fat content—is valued negatively for its health effect may be a reason for partial disclosure in the salad dressing market and may explain why mandatory labeling had an impact. Mathios concluded that even in markets with credible, low-cost mechanisms for disclosure, mandatory labeling can influence consumer choices.

The raw meat and poultry products market provides an instance where a voluntary labeling mechanism was attempted. The U.S. Department of Agriculture's Food Safety and Inspection Service's (FSIS) initial rules for nutrition labeling (effective July 1994) required mandatory labeling of most meat and poultry products. However, raw, single-ingredient meat and poultry products such as chicken breasts, ground beef, and whole unbasted turkey were exempted, although manufacturers and retailers of these products were encouraged to voluntarily provide nutrition information. FSIS indicated that it would monitor participation in the voluntary labeling program and would consider mandatory labeling regulation if participation remained below 60 percent. Evaluations in 1996 and 1999 found voluntary labeling to be below this limit (58 percent and 55 percent, respectively).⁶ Therefore, in 2000, FSIS initiated a proposal to extend mandatory nutrition labeling to single-ingredient raw meat and poultry products (U.S. Department of Agriculture, 2001).

Consumer Irrationality⁷

The standard economic model in which unhindered market transactions lead to optimal allocation of resources relies on the assumption that consumers are rational economic agents who make choices so as to maximize utility over their lifetime. Consumers may trade off future well-being for current pleasure, but they do so fully informed (or informed to the extent they are willing to invest in information) about the consequences. A growing body of evidence, however, has questioned this basic economic assumption about consumer rationality. Specifically, while rational forward-looking behavior rests on individuals having stable time preferences or discount rates (that is, the rate at which an individual values current consumption against future consumption), an emerging body of evidence seems to suggest that discount

⁶One reason limiting more widespread labeling in the market for single-ingredient meat and poultry products may be that producers have limited opportunity to differentiate their products based on nutritional characteristics.

⁷Here, the word irrational is used in the sense of deviating from the economic assumption of rationality.

rates are both unstable and vary across different types of choices over time (Frederick et al., 2002). Economists have evoked such inconsistency in preferences to explain behaviors involving lack of self-control (e.g., intending to exercise but putting it off when the time comes) in which individuals seem to be acting against their own self-interest.⁸

Dropping the assumption of stable discount rates in favor of time-inconsistent preferences has dramatic implications for public policy. For example, Gruber and Koszegi (2001) studied the implications of cigarette taxes on smokers with time-consistent and time-inconsistent preferences. Time-consistent smokers make smoking decisions rationally, trading off future health for current pleasure. Time-inconsistent smokers want to quit smoking but are unable to do so: they lack self-control. A tax increase reduces cigarette consumption of both types of smokers. However, while the higher tax leaves time-consistent smokers worse off, it makes time-inconsistent smokers better off. The reason is that the higher tax acts as a commitment device that helps inconsistent smokers overcome their self-control problem.⁹

Although evidence of time-inconsistent behavior is widespread, such behavior is not universal. Not all individuals lack self-control or procrastinate in a particular situation. Therefore, public policies to remedy time-inconsistent behaviors should be “asymmetrically paternalistic,” that is, benefit those who make errors while imposing little or no burden on those who are making rational tradeoffs between current pleasure and future well-being (Camerer et al., 2003). One set of policies that meet the asymmetrically paternalistic criteria is mandatory information disclosure. In many instances, relatively less intrusive policy changes, such as requiring firms to disclose product information, might help irrational people make better decisions, while having no effect (aside from reducing information costs) on rational decisionmakers. Nutrition labeling for food away from home would seem to fit this criterion. Readily available information about the nutrient content of alternative menu items may provide a mechanism for self-control for the irrational types while not harming the rational types.¹⁰ Whether and to what degree the policy will be effective for the irrational types depends on the degree of their self-control problems and their prevalence in the population, about which little is known.¹¹

Benefits and Costs of Labeling

Federal regulatory agencies are required to justify any new regulation by evaluating its benefits and costs based on several criteria. An example of such evaluation can be found in FDA’s November 1999 proposal to amend its nutrition labeling regulations to require listing the amount of trans fatty acids (U.S. Department of Health and Human Services, 1999) on packaged foods. Any new regulation requiring nutrition labeling for food away from home will be subject to such regulatory impact analysis.

⁸Although economists have only recently begun to apply self-control models to eating behaviors (e.g., Cutler, et al., 2004; Smith, 2004), there is a rich psychological literature in this area (e.g., Epstein and Saelens, 2000).

⁹Gruber and Mullainathan (2002) present empirical evidence in support of this implication. Using independent data from the United States and Canada, they found that when excise taxes on cigarettes rise, those who are predicted to be smokers report significantly higher subjective well-being, suggesting that a time-inconsistent model is more appropriate.

¹⁰If the disclosure requirements lead to higher product prices, rational types could suffer a net welfare loss. More generally, disclosure requirements would introduce costs, including possible cognitive costs that need to be weighed against benefits; see more on this in the next section.

¹¹An information disclosure policy intended to enable better self-control has implications for the type of disclosed information. Information that reveals the costs or benefits of the attributes may be more effective. For example, rather than merely disclosing the calorie content of a meal, a label could make the tradeoff more explicit by indicating the physical activity equivalent of the calories. However, whether such information or any other type of nutritional information may help consumers with self-control problems remains to be empirically verified.

Benefits of Labeling

Dietary Change

One source of benefits from a mandatory food-away-from-home labeling policy is a change in consumer behavior following the disclosure of nutritional attributes. Consumers may use the information to make more healthful dietary choices, and this may result in better health outcomes such as a reduction in morbidity and mortality associated with poor diet quality and obesity. Factors such as whether the information is important to a large number of consumers (or extremely important to a small group of consumers), the relative health effects of specific attributes listed on the labels, and the ease with which information can be used by individuals, will determine whether labeling will alter behavior enough to make a significant difference in health outcomes. Large benefits are gained if intake of a dietary component that poses a conclusive and significant health risk is altered following disclosure. In the case of FDA's November 1999 proposal for listing the amount of trans fatty acids, the risk proved compelling enough that the Office of Management and Budget, which oversees all Federal regulations, urged FDA to accelerate publication of the final rule (Office of Management and Budget, 2001).

On the other hand, benefits from better health outcomes may be negligible if the disclosed information has little effect on dietary choices or the behavioral effect produces insignificant health benefits. Estimating the effect of labeling on dietary choices in an away-from-home setting is methodologically challenging. Although limited in number, experimental studies with proper control of factors other than information that may affect dietary intakes provide the best type of evidence. Recent studies suggest that the dietary effect of nutritional information in away-from-home settings may be small or negligible (see box, "Effect of Nutrition Information on Food-Away-From-Home Intakes"). One study of food intake among normal-weight women found that explaining the concept of energy density (amount of calories per gram of food) and providing nutrition information on labels during meals had no impact on subjects' energy intake. The pattern of food intake was similar between subjects who received information and those who did not (Kral et al., 2002).

Another experiment in an actual restaurant setting in England found that provision of nutrition information had no effect on overall energy and fat intake (Stubenitsky et al., 2000). In fact, the presence of "lower fat" information was "associated with a trend toward a decreased proportion of restaurant patrons selecting the target dish." Sproul et al. (2003) assessed the effectiveness of nutrition labeling on sales of "healthy" lunch-time entrées in an Army cafeteria. Sales were compared between a 1-year baseline period and two 30-day postintervention periods after the placement of nutrition labels. Analysis found no significant difference between the baseline and the two intervention periods for either the mean sales of the healthy (labeled) entrees or the proportion of healthy entrée to total entrée sales.

These findings suggest that the benefits of labeling (a change in consumer behavior leading to better nutritional outcomes) may be small or uncertain at best. However, consumer response to labeling may depend on how the infor-

Effect of Nutrition Information on Food-Away-From-Home Intakes

An exhaustive review of evidence is not attempted in this report. Each of the recent studies cited provides overviews of previous experimental studies on the influence of nutrition information on food intakes. Results from these earlier studies are described as “conflicting” or “mixed.”

For example, Kral et al. (2002) reviewed studies that examined whether the level of “dietary restraint” influenced the effect of nutrition information on food intake. Two studies they reviewed found that restrained eaters were more responsive to nutrition information than unrestrained eaters, two studies found the opposite result, and one found that both restrained and unrestrained eaters responded to information. In this last case (Shide and Rolls, 1995), the response of both groups was that they consumed more energy at lunch after eating a yogurt labeled “low-fat” than after eating a yogurt with similar energy content but labeled “high-fat.” In other words, subjects behaved as if they have a nutrient budget; they used label information to adjust their subsequent intake, though not necessarily in a way that would change their total daily intake. Caputo and Mattes (1993), Chapelot et al. (1995), and Aaron et al. (1995) have reported similar results, where subjects informed of the lower fat status of a dish increased their subsequent energy intakes. These types of substitutions would increase consumer welfare in an economic sense, although no net nutritional change may be observed. Such benefits from information-induced substitutions are discussed further in a later section.

Other studies have noted that labels may produce expectations about taste. For example, Yeomans et al. (2001) report that low-fat labels on soup produced lower anticipated hedonic ratings and high-fat labels produced higher hedonic ratings among subjects. After consumption, soups labeled high-fat were rated both as more pleasant and creamier than those labeled low-fat, independent of actual fat content. Producer knowledge about such consumer response may limit voluntary reformulation and labeling.

mation is provided, the content of the information, and the type of consumer receiving the information. Response to labeling or related forms of information disclosure may also vary depending on the nutrient densities of the offerings. For example, the effect of disclosing the calories content of highly energy-dense meals may be different from the effect of disclosing the calories content of meals with low or moderate energy densities. This means, depending on energy and other nutrient densities of menu items, response to information disclosure in a fast-food restaurant may be different from response to information disclosure in a sit-down restaurant. Therefore, findings from experimental studies discussed here must be generalized with care.

Reformulation

Even if a labeling policy has no direct effect on consumer intake, it could still benefit consumers by improving nutritional outcomes through producer-initiated reformulation of products. Suppose a food-away-from-home labeling policy requires disclosure of nutritionally negative attributes such as calorie, fat, and sodium content. Under such a mandatory disclosure rule, firms selling products with high amounts of these nutrients may choose to reformulate to reduce the nutrient amounts rather than risk losing sales (to firms selling nutritionally better products). Such reformulation could

change the entire range of market offerings and potentially result in better nutritional outcomes for consumers. Through product reformulation, labeling may benefit all consumers who use the products, not just those who read the label. In fact, more healthy offerings resulting from reformulation may be the largest benefit of labeling (Beales, 1980).

Evidence about the degree of reformulation that may occur under a mandatory food-away-from-home labeling policy can be found by examining response in the packaged foods sector following changes in the health claims rules in the mid-1980s and the enforcement of the NLEA in 1994. In 1985, the Federal Trade Commission (FTC) and the FDA relaxed the rules governing health claims in food advertising and labeling. Citing several lines of evidence, Mathios and Ippolito (1999) argued that this change in the regulatory environment led to significant product innovation and change in consumer behavior. For example, cereal manufacturers responded to their new ability to advertise the health benefits of fiber by developing new high-fiber cereals. Between 1985 and 1987, fiber content of cereals for adult consumption averaged 3.59 grams per ounce, compared with an average of 1.99 grams for cereals introduced between 1978 and 1984.

In a study of NLEA's effect in the snack cracker market, Mayer et al. (1998) found that for products containing information about fat content, the average fat content and the average share of calories from fat per serving were significantly lower in 1995 (post-NLEA) compared with 1991 (pre-NLEA). In New Zealand, reformulation spurred a significant reduction of salt in food products following the introduction of the *Pick the Tick* logo program, which allows display of the logo on products that meet defined nutritional criteria. According to Young and Swinburn (2002), in a 1-year period from July 1998 to June 1999, *Pick the Tick* influenced food companies to exclude about 33 tons of salt through reformulation of 23 breads, breakfast cereals, and margarine.

The degree of reformulation following a food-away-from-home labeling policy will depend on how much producers feel they can benefit from such a strategy. Consumers appear to value taste highly in food consumption relative to other attributes. For example, according to the 1994-96 Diet and Health Knowledge Survey, 82 percent of adults consider taste as very important when buying food, compared with only 63 percent who consider nutrition as very important. In a study on consumer valuation of product attributes in the frankfurter market, Harris (1997) found that consumers place a positive value on taste as indicated by the fat content. Consumers were willing to pay 0.67 cent for an additional gram of fat in each hot dog. High consumer valuation of taste suggests that if the costs of reformulation while preserving taste are high, reformulation may be limited.

Alternatively, while a certain degree of reformulation may occur in the aftermath of a labeling policy, this may decline as firms observe consumer response to the reformulated offerings. Examining the salty snack market over the 1995-99 period (recall that NLEA became effective in 1994), Allshouse et al. (2002) observed that "food manufacturers ... introduced 1,914 new reduced/low-fat products in 1995 and 2,076 in 1996. The market for these products, however, never grew as anticipated, as food processors dramatically cut their new product introductions of lower fat products after

1996, introducing only 481 new products in 1999.” Mojduszka et al. (1999) analyzed nutritional quality change in product offerings using data from all offerings in five food categories (entrees, soup, salted snacks, cookies, and processed meats and bacon) in a New England supermarket during 1992-95 and 1997. Their analysis showed no significant change in the average nutritional quality of products offered in any of the five categories.

Moorman (1998) provides perhaps the most detailed study of producer response to mandatory labeling requirements (under the NLEA) using data on branded products sold in 21 categories and new brand introductions over pre- and post-NLEA periods. Results showed that producers responded strategically by changing the nutritional quality of base brands (brands that are not positioned with regard to nutrition) and brand extensions (brands positioned nutritionally, e.g., low-fat) in opposite ways. Specifically, compared with the pre-NLEA period, base brands that added positive nutrients increased in the post-NLEA period, but those that reduced negative nutrients did not change significantly. Conversely, over the same period, brand extensions involving deletion of negative nutrients increased while those involving addition of positive nutrients remained unchanged. Besides this strategic reformulation response, firms also tended to use price promotion strategy based on brand healthiness: more nutritionally poorer brands were promoted in the post-NLEA period while promotion of nutritionally better brands did not change significantly between the two periods. These results show the likely complexity of the reformulation effects of a food-away-from-home labeling policy.

A potential problem with looking at a specific set of product categories to assess reformulation effects is that it may not capture the effect of reformulation in the entire sector on consumer diets. Subject to some assumptions, estimates of the overall reformulation effect of the NLEA on consumer diets can be calculated from USDA’s 1989-91 and 1994-96 food consumption surveys. From representative samples of individuals, these surveys measured food intakes identified by the source—whether the food was purchased at a store for at-home preparation and consumption or if it was purchased from an away-from-home source. Since mandatory NLEA labeling requirements are applicable only for packaged foods sold in stores, any effects of reformulation in the post-NLEA period (1994-96) compared with the pre-NLEA period (1989-91) should be reflected in changes in the at-home dietary intakes between these periods. Apart from the NLEA, diets could of course have changed due to other factors. However, to the extent that these non-NLEA factors influence both the packaged food and food-away-from-home sectors, their effect can be estimated from the dietary changes in the away-from-home share of consumer diets. Assuming NLEA is the only factor that affected at-home consumption and not away-from-home consumption, the NLEA-induced reformulation effect can be estimated by subtracting dietary changes in away-from-home food consumption from dietary changes in at-home consumption. This procedure gives the reformulation effect because the change is estimated for the entire population, not just the label users (who may have changed their diets after reading the label). However, a large effect of label use may inflate the estimated reformulation effect. Because of this, and also because at-home diets may have improved due to, say, a general increase in nutrition knowledge or other

Table 2— At-home and away-from-home nutrient intakes in the pre- and post-NLEA periods

Nutrient	At-home			Away-from-home			Reformulation effect
	1989-91	1994-96	Change	1989-91	1994-96	Change	
Energy (calories/kg of food)	921.8	873.7	-48.1***	1034.8	1064.9	30.1*	-78.2***
Total fat (gm/1,000 calories)	38.1	34.7	-3.4***	42.0	41.7	-0.2	-3.1***
Saturated fat (gm/1,000 calories)	13.5	12.0	-1.6***	14.8	14.0	-0.8***	-0.8***
Cholesterol (mg/1,000 calories)	144.1	122.6	-21.5***	138.7	135.6	-3.2	-18.3***
Fiber (gm/1,000 calories)	7.8	7.9	0.1	6.4	6.5	0.1	0.0
Protein (gm/1,000 calories)	40.7	37.2	-3.5***	38.7	38.9	0.2	-3.7***
Carbohydrate (gm/1,000 calories)	123.9	134.2	10.3***	114.7	113.9	-0.8	11.1***
Sodium (mg/1,000 calories)	1,683.0	1,629.0	-54.2***	1,685.0	1,706.0	21.6	-75.8***
Calcium (mg/1,000 calories)	447.7	416.0	-31.7***	355.3	343.7	-11.6*	-20.1**
Iron (mg/1,000 calories)	8.2	8.2	0.0	5.9	6.4	0.4***	-0.4***
Vitamin A (mcg/1,000 calories)	601.2	542.1	-59.1***	357.7	342.8	-15.0	-44.1*
Vitamin C (mg/1,000 calories)	56.2	54.9	-1.3	35.7	32.1	-3.6***	2.3

Note: Reformulation effect is computed as the difference between the change in at-home nutrient intake and the change in away-from-home nutrient intake.

Statistical significance: ***=p<0.01, **=p<0.05, and *=p<0.1.

Source: Author's calculations from the Continuing Survey of Food Intakes by Individuals (CSFII), 1994-96 and 1989-91.

factors that did not affect intakes of food away from home, the estimated reformulation effect should be viewed as an upper bound of true reformulation due to the NLEA.¹²

Subject to the above caveats, estimated reformulation effects over the pre- and post-NLEA periods for 12 nutrients are presented in table 2. To control for possible changes in the amount of food consumed over the years and across the food sources, all quantities are expressed as densities: energy is expressed as calories per kilogram of food and other nutrients are expressed per 1,000 calories. The third column in the table reports change in at-home intakes from the pre-NLEA period to the post-NLEA period and the sixth column reports the same for away-from-home intakes. The final column gives the estimated average reformulation effects per day. The effects are significant and beneficial for energy, total fat, saturated fat, cholesterol, and sodium. Excepting saturated fat, the away-from-home intakes of these nutrients did not decline significantly and, in fact, increased for energy, while at-home intakes declined in all cases. At-home protein intake declined while carbohydrate intake increased.¹³ Much of the nutritional concern in the mid-1990s was focused on reducing fat intakes. This may explain the increase in carbohydrate and the decrease in protein densities. If Moorman's (1998) findings have wider applicability in other product categories, a greater consumer acceptance of new brands that focus on reducing negative nutrients compared with those that focus on increasing positive nutrients could explain the net decline in calcium, iron, and vitamin A intakes. Taken together, these results suggest that, over all the products consumed, reformulation effects from a labeling policy may be large. However, popular nutrition concerns in the relevant time period could also affect reformulation and, in turn, alter nutritional outcomes for consumers in unexpected ways.

Substitutions

Another benefit of a food-away-from-home labeling policy may accrue when labels provide information that enables consumers to make food choices that are better aligned with their preferences than when the information was unavailable (Teisl et al., 2001). Such a benefit will accrue even if labeling does not result in measurable changes in nutritional or health outcomes. Consumers may act as if they have nutrient or health-risk budgets—the new information may allow consumers to gain utility by substituting among foods while bearing the same health risk as before.¹⁴ Tiesl et al. (2001) investigated such consumer welfare gains using a demand system estimated from supermarket scanner data and found them to be substantial.

Costs of Labeling

As with other food-labeling initiatives (e.g., Teisl and Roe, 2001), the financial cost of food-away-from-home nutrition labeling would have many components. First, the regulatory agency would expend funds to decide what information to disclose, to design a standardized label, and to monitor compliance. The food-away-from-home sector is so varied in terms of scale, menus, and practices that designing a standardized labeling approach would be challenging. A second cost component, borne by the firms, would

¹²There are additional reasons to be cautious about these estimates. Factors other than the NLEA, including competitive strategies adopted by manufacturers in response to changes in consumer preferences, could have influenced reformulations between 1989-91 and 1994-96. Also, differential price changes in at-home and away-from-home foods could influence the results.

¹³As noted earlier, estimates in the final column of table 2 can be interpreted as reformulation effects because they are estimated for the entire population, not just label users. In a separate study that used a similar procedure to estimate the label-use effect of the NLEA, we found strong evidence of a positive effect for fiber, protein, and iron (Variyam, 2004). As can be seen from the final column of table 2, the reformulation effects are quite distinct from label effects; there is no reformulation effect for fiber, and the effects are negative for protein and iron.

¹⁴Studies cited in the box titled "Effect of Nutrition Information on Food-Away-From-Home Intakes" give evidence of consumers' altering their subsequent intake when information about current intake is disclosed.

include expenses for printing labels on wrappings and menu boards. A third and much larger cost component would be expenses borne by firms, especially independent establishments, to standardize menus and alter food procurement and preparation practices to meet labeling requirements. This cost, plus the cost of analyzing recipes for nutrient content, would be recurring as firms introduce new food items or change recipes. High costs may deter firms, especially independent establishments, from changing recipes and introducing new menu items.¹⁵ In a 1994 study of major foodservice corporations, menu- and personnel-related obstacles were cited as the major reasons against nutrition labeling (Almanza et al., 1997). Menu-related obstacles included too many menu variations, limited space on menus for labeling, and loss of flexibility in changing the menu. Personnel-related obstacles included difficulty in training a constantly changing employee force and lack of time for foodservice personnel to implement labeling.

While product reformulation may confer benefits to consumers, the reformulation process would cost the producers. Reformulating away-from-home food offerings will be different from reformulating packaged foods because much of the food-away-from-home sector caters prepared meals rather than individual ingredients that make up a meal as in the packaged foods sector. Given the link between taste and the amount of dietary components such as fat, salt, and sugar used in preparation, reformulating existing recipes or formulating new recipes to lower the amounts of these components while preserving taste will be especially challenging (Muth et al., 2004).

Another cost of a food-away-from-home labeling policy could come from the loss of shareholder wealth that results from declines in the stock prices of away-from-home food firms if a mandatory labeling requirement is enacted. Any regulatory event that imposes costs on producers would impact shareholders' wealth based on the market's assessment of the role that the event may play in the future growth of the firms. Gahni and Childs (1999) investigated the wealth effects of the passage of the NLEA by examining the stock price reaction of 38 large U.S. multinational food corporations. They studied stock price reaction to four separate events during NLEA's passage and found that all four events had an adverse impact on shareholders' wealth.

Just as some consumers may value labeling that enables them to match their purchases with their preferences, the additional information from labels may impose cognitive costs on other consumers (Roe et al., 1999; Teisl and Roe, 2001). The additional information provided by labels may actually decrease the consumer's ability to process other information such as nutrient content claims on menus already permitted under current laws. Further, many consumers may not desire to have such information, or may be burdened by the additional information since they may not associate restaurant dining with controlling their diet (National Restaurant Association, 2002b). Consumers may believe that it is less important to consider the nutritional quality of food away from home or be less willing to sacrifice taste when eating out (Guthrie et al., 2002). In Stubenitsky et al.'s (2000) randomized

¹⁵Most food-away-from-home labeling proposals under debate are targeted toward chain restaurants.

trial of full- and reduced-fat meals with and without nutrition information, researchers “observed a trend toward *lower selection* of the lower fat dish among subjects informed of its lower fat status...” (emphasis added). Another study of restaurant menu labeling reported that taste was the primary reason given by patrons for their entrée choice, regardless of whether or not it was labeled (Albright et al., 1990).

Conclusion

The trends toward higher consumption and lower nutritional quality of food away from home are the outcome of the economic forces of supply *and* demand. Away-from-home-food is of lower dietary quality not just because providers supply such food, but also because there is consumer demand for such food—or its attributes such as taste and convenience. At the same time, market characteristics suggest that the information disclosure mechanism may result in a lack of nutritional information for buyers. Sellers have an incentive not to disclose “negative” attributes about their products because these same ingredients usually enhance taste. To the extent that this lack of disclosure leads to consumption levels that would differ if buyers were better informed, asymmetric information might be creating an inefficient market outcome. Suboptimal consumption of food away from home may also occur if some consumers have self-control problems, exacerbated by a lack of readily accessible nutritional information. Depending on the severity of these “market failures,” a mandatory food-away-from-home labeling policy requiring disclosure of nutrition information may increase transaction efficiency between sellers and buyers in the food-away-from-home market. The economic basis for deciding on such a policy would critically depend on accurately estimating the benefits and costs of alternative policy options.

If a specific food-away-from-home labeling policy is devised, the financial cost of implementation can be assessed reasonably well. The aggregate cost will depend chiefly on the extent of the away-from-home food sector that is subject to the mandatory disclosure requirement. The benefits of the labeling policy, on the other hand, would be harder to assess. This results from uncertainty surrounding the effect of label information on the intended behavior. Would providing additional nutrition information in a restaurant setting lead to better overall diet quality and reduced caloric intakes? Recent research on this subject suggests a limited impact. This uncertainty, plus the uncertainty of attributing any change in health outcomes to a specific labeling policy change, makes the calculation of benefits difficult. Although product reformulation appears to be by far the biggest source of benefits, there is some uncertainty regarding the degree and persistence of reformulation.

Besides the overall benefit-cost ratio, the *distribution* of the benefits and costs among producers and consumers may be an additional factor that could influence a labeling policy decision. Due to differences in economies of scale, types of offerings, and recipe standardization, a labeling policy could differentially affect away-from-home food providers, potentially putting some at a competitive disadvantage. Such effects will have to be weighed in a labeling decision. On the consumer side, there is some uncer-

tainty as to who specifically will benefit from the nutrition information provided by the labels. Will the benefits be reaped mainly by those who already have good quality diets and healthy weights (who may use the new information to further optimize their dietary choices and health), or will the benefits also be shared by those with poor diets and the overweight? Economic theory suggests that those who use an input most heavily also benefit the most from a reduction in the price of that input. For this reason, government policies that reduce the price of health inputs can increase health disparities (Goldman and Lakdawalla, 2001). The reduction in the price of nutrition information brought about by a labeling policy could therefore be most beneficial to heavy users of that information—usually the more educated, who also tend to have better diets and healthier weights to begin with. In this case, although a labeling policy may realize a significant benefit, little of that benefit may be accruing to the less educated and low-income segments of the population.

Nutrition information is just one type of information that may be of interest to consumers. As new production processes evolve and new risks are identified, additional concerns such as labeling of organic food, biotech content, and pesticide use are being raised (Teisl and Roe, 2001). Given competing disclosure demands and limited label space, a policy to disclose all, based on existence of asymmetric information, would not be practical or cost-effective. Accurate estimates of potential benefits and costs of each type of information become more important. In this scenario, developing an optimal information policy may require considering approaches other than mandatory labeling.

One such alternative approach in the food-away-from-home sector may be reducing the requirements for making voluntary health claims. Under the present regime, the cost of making claims may be high enough to deter many away-from-home food providers from providing any nutrition information at all (Boger, 1995; Muth et al., 2004). In the packaged foods market, relaxation of health-claim regulations have had a positive impact on voluntary information provision, leading to a decrease in fat, saturated fat, and cholesterol consumption (Mathios and Ippolito, 1999). A relaxed health-claims policy, however, has to be weighed against the possibility that it may increase the likelihood of deceptive and misleading claims. Mayer et al. (1998) compared health claims on snack cracker packaging and fat content during pre- and post-NLEA periods and found that the prevalence of potentially misleading claims declined from 77 percent in 1991 to 49 percent in 1995.

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